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COLLAPSIBLE REUSABLE BOX

BACKGROUND

Collapsible corrugated boxes made of paperboard and corrugated plastic currently are extensively used. One form of such boxes is known as an auto-bottom box; and it is constructed by means of hinged-together bottom panels, with diagonal hinges interconnecting bottom panels from the ends of the box with bottom panels folded from the sides of the box to automatically form a strong bottom for the box when it is opened or set up. Auto-bottom boxes are particularly useful for packing and shipping goods at a central distribution warehouse for shipment to end users in the form of retail outlets and the like. After the box is unpacked at the end user, it is collapsed back to a flat configuration and shipped back to the original warehouse distribution center, whereupon it once again may be filled and returned to the end user.

Auto-bottom boxes, or other types of reusable boxes, cause substantial savings in the cost of materials to be realized by the business or other entity employing such reusable boxes over boxes or containers which are designed only for one time use between a distribution center and the end user, whereupon they are destroyed or recycled. In addition to the substantial monetary savings realized by reusing boxes, significant conservation of raw materials also is achieved. In view of the awareness of the high impact of throw-away materials on the environment, reusable collapsible boxes are achieving widespread acceptance.

A popular material for reusable collapsible boxes of the auto-bottom type is corrugated plastic, because of its relatively greater life expectancy over that of corrugated paperboard. Corrugated plastic boxes, however, have some disadvantages when this material is employed in auto-

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bottom boxes, inasmuch as the plastic has a greater memory retention or stiffness compared with corrugated paperboard.

A typical corrugated plastic auto-bottom box is disclosed in the United States patent to Dowd No. 6,349,876. The structure of this box is typical of the structure of auto-bottom boxes; and the patent discloses the use of cut or perforated score lines where the bottom panels interconnect with the side and end panels in order to reduce the memory of the plastic in assisting the stability of the box when it initially is erected or set up. Even so, boxes manufactured in accordance with the disclosure of this patent tend to skew toward their flattened condition when they are opened up. This occurs in part because the bottom flaps connected to the sides are designed to extend less than the full width of the box, in order to facilitate the collapsing of the box after it has been emptied and is to be re-shipped back to the original source. This problem is exacerbated as the thickness and ply of the corrugated plastic increases, even though double score lines and/or perforated score lines are employed in an effort to reduce the memory of the plastic material. It has been found that when a box of this construction initially is erected for filling, the person filling the box frequently must use one hand to hold the box in its open configuration until a certain amount of product has been placed in the box, whereupon it gains stability.

It is desirable to provide an improved collapsible reusable box which overcomes the disadvantages of the prior art, and which has a desired stable configuration immediately upon set-up when the box still is empty.

SUMMARY OF THE INVENTION:

It is an object of this invention to provide an improved collapsible reusable box.

It is another object of this invention to provide an improved collapsible reusable corrugated

box of the auto-bottom type.

It is an additional object of this invention to provide an improved collapsible reusable box made of corrugated material which maintains its desired shape immediately upon set-up, without collapsing on itself.

It is a further object of this invention to provide an improved collapsible reusable box made of corrugated material which employs a locking tab end and mating slot on the bottom of the box to facilitate set-up of the box.

In accordance with a preferred embodiment of the invention, a collapsible reusable box has first and second side walls and first and second end walls hingedly interconnected together. First and second bottom end flaps are hingedly connected to the first and second end walls, respectively; and first and second bottom side flaps are hingedly connected to the first and second side walls, respectively. The first bottom side flap has a width which is less than the width of the first and second end walls; and the second bottom side flap has a free edge and a width which is substantially equal to the width of the first and second end walls. The free edge of the second bottom slide side flap which is opposite the hinged interconnection of the second side wall has a projection which extends outwardly from that edge. When the box is set up, the projection extends into a mating slot located at the junction of the first side all and the first bottom side flap to maintain the desired shape of the box after initial set-up and during filling of the box.

BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 is a plan view of a blank for an auto-bottom box in accordance with a preferred embodiment of the invention;

Figure 2 is a top perspective view of a collapsible auto-bottom box of a preferred

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embodiment of the invention;

Figures 3 and 4 are cross-sectional views taken along the lines 3/4 of Figure 2 illustrating features of the preferred embodiment of the invention; and

Figure 5 is a top view of the box shown in Figure 2 illustrating features of a preferred embodiment of the invention.

DETAILED DESCRIPTION:

Reference now should be made to the drawings, in which the same reference numbers are used throughout the different figures to designate the same or similar components. Figure 1 is a plan view of a unitary blank for the construction of a collapsible auto-bottom box made of corrugated material, preferably corrugated plastic. As shown in Figure 1, the blank includes a pair of side walls 11 and 21, which form the opposite sides for the length of the box, and end walls 36 and 46, which constitute opposite ends of the box when the blank is formed into a finished box.

A full width bottom flap 10 is hingedly attached to the side wall 11, and a shorter bottom flap 20 is hingedly attached to the side wall 21. The end walls 36 and 46 have bottom flaps 30 and 40 attached to them, along with corresponding glue flaps or attaching flaps 32 and 42, which are attached to the bottom end flaps 30 and 40 at diagonal hinge lines 34 and 44, respectively.

The top of the box is formed by top side flaps 12 and 22, which are folded down, respectively, from the tops of the side walls 11 and 21, and end top flaps 38 and 48, which are hingedly attached to the tops of the end walls 36 and 46, respectively. Fold lines or creases 39 and 49 are formed in the flaps 38 and 48, respectively; and these are used to assist in the insertion of these flaps into L-shaped slots 60 (on the top flap 22) and 70 (on the top flap 12) to releasably close the top of the box formed from the blank after it is filled with material for shipping and handling.

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A vertical flap 50 is attached by a fold line or crease 51 at the edge of the side wall 21. The flap 50 is designed to be joined to the left-hand edge of the end wall 46 when the box is constructed. This joining may be by means of ultrasonic bonding, melt bonding, or an adhesive. Similarly, the flap 32 is joined to the bottom side flap 20; and the flap 42 is joined to the bottom side flap 10 by means of melt bonding, ultrasonic bonding, or adhesive, to form the standard configuration of an auto-bottom box.

Each of the end walls 36 and 46 also has a corresponding handle flap 80 and 90 formed in it in the shape of an inverted U-shaped cut to form gripping or carrying handles in the box at opposite ends, as shown most clearly in Figure 2. The vertical dotted lines 51,54,56 and 58 and the double dotted line 52 and the single dotted line 59 all are fold lines or crease lines, which are formed by conventional techniques into the blank, to allow the various parts to be folded together to form the completed box shown in Figure 2.

Because of the memory inherent in corrugated plastic, when corrugated plastic material is used for the blank of Figure 1, it is preferable to use a double parallel fold line or perforated line 52 along the bottom flaps of the box, since when the box is collapsed into its shipping or storage configuration, these flaps are folded substantially 180° against the corresponding side and end walls 11, 21,36 and 46. All of the score lines or fold lines, as described previously, are made to be repeatedly folded and opened to allow the box to be formed in the configuration shown in Figure 2, and then once again flattened for shipping subsequent to emptying of the box at its point of use.

In order to prevent the inherent memory in corrugated materials, particularly corrugated plastic material, from tending to skew or flatten the box when it is initially set up, prior to filling, the bottom side flap 10 is constructed, as shown most clearly in Figure 5, with a width established

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by the edge 15 which is substantially equal to the width of the end walls 36 and 46 of the box; so that the flap 10 extends entirely across the bottom of the box to cause the free edge 13 of the flap 10 to lie immediately adjacent the bottom edge of the opposite side wall 21 when the box is opened to its erected position. This is in contrast to conventional auto-bottom boxes, in which a bottom flap most nearly corresponding to the bottom side flap 10 has a width which is less than the full width of the box. In addition, it should be noted that the edge 15 is designed to lie parallel to and immediately adjacent the side wall 36 while the edge 14 is tapered to facilitate subsequent collapsing of the box.

The configuration described above for the bottom side panel 10 in and of itself substantially reduces the tendency for the box to collapse into a flattened configuration when it immediately is set up. In addition, however, the free edge 13 of the bottom side flap 10 has a projection 17 located in it. This projection is aligned with a slot 24 in the bottom side wall 21. Consequently, when the box is erected and the bottom side flap 10 is pushed downwardly in the direction of the arrow shown in Figure 3, it causes the projection 17 to pop into the slot 24 to hold the bottom side flap 10 in its downward position. This, in turn, holds down the bottom side flap 20 ; and the entire box is stable in its erected configuration, as shown in Figure 2. Figure 4 shows the extension of the projection 17 into the slot 24 for the assembled box.

After the box has been emptied of its contents, and it desired to flatten the box, a return to the diagonally flattened condition readily is effected by a slight outward pressure on the inside of the side wall 21 to release the projection 17 from the slot 24. This may be accompanied by lifting of the edge 14 of the bottom side flap 10; although the natural memory of the corrugated material, particularly plastic corrugation, is such that once the projection 17 is released from the slot 24, the bottom side flap 10 tends to raise upwardly in the opposite direction of the arrow of Figure 3 to the

position shown in Figure 3 to facilitate the subsequent re-flattening or collapse of the box.

The incorporation of the projection 17 on a substantially full-width bottom side flap 10 and the utilization of a corresponding mating slot 24 to modify an otherwise standard blank for an auto-bottom box requires no change to the box making machinery. However, a significant improvement in the performance of auto-bottom boxes, particularly made of corrugated plastic material, is achieved. At the same time, the reusable characteristics of the auto-bottom box have not been compromised; and the construction allows for multiple cycles of erection and collapsing of the box, employing all of the advantages present in such auto-bottom box constructions.

The foregoing description of the preferred embodiment of the invention is to be considered as illustrative and not as limiting. Various changes and modifications will occur to those skilled in the art for performing substantially the same function, in substantially the same way, to achieve substantially the same result, without departing from the true scope of the invention as defined in the appended claims.

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